TECH TREK Mobile Research
Laboratory Adventure
Teachers' Guide

Suggested Grades: 4-9

Objectives:

- Apply the use of tools to measure lengths, using centimeters and inches (M4-17).
- Select instruments to make observations and/or organize observations of an event, object, or organism (S4-2).
- Evaluate a simple procedure to carry out an exploration (S4-6).
- Identify and/or discuss the selection of resources and tools used for exploring scientific phenomena (S4-7).
- Recognize the advantages and/or disadvantages to the user in the operation of simple technological devices (S6-6).
- Demonstrate an understanding of the use of measuring devices and report data in appropriate units (S9-4)
- Apply the concepts of energy transformations in electrical and mechanical systems (S9-10).
- Describe the relationship between technology and science (S9-19).

Strategies:

- With skillful introduction and follow-up from the instructor, this activity can become an ambitious use of the equipment on TECH TREK Mobile Research Laboratory. Students take on the role of investigative reporters. They are encouraged to explore each of the learning centers on the vehicle, take notes and pictures, and finish with a written or spoken report.
- Measurement Using the microscopes to measure small objects can reinforce a student's understanding of lengths in the metric system. We can measure images that have been magnified on the screens. We can then divide by the scale factor to estimate the actual length. We can use the scale bar on SEM images to estimate measurements in millimeters, micrometers, and nanometers. We also can measure directly using the mouse on saved images within the SEM software. Advanced students can measure 3-D figures in several dimensions to estimate areas and volumes of simple shapes, such as salt crystals or coins.

- Evaluating technological resources In this context, students can compare magnifying lenses, various light microscopes, Intel Play and the SEM. They can discuss the selection of tools for exploring scientific phenomenon. They can include these experiences in a discussion of the advantages and disadvantages to the user in the operation of various technological devices. They can discuss the relationship between technology and science.
- Exploring the concepts of energy transformation in electrical and mechanical systems Students could be directed to describe how energy is used in each of their sketches of the equipment. For example, our simplest light microscopes plug into the wall sockets where they receive alternating current (created by the generator, but that's another story). The current lights a bulb below the stage. This light travels through the specimen to the lenses in the microscope, where an enlarged virtual image can be viewed through the eyepiece.
- Post-activities might include collaborative group work preparing presentations on one of these themes. In this way, each student can concentrate on developing a quality audiovisual sound bite of a small part of the whole while the entire class will be able to review and learn from the complete project. If you have the resources, you might want to have students create PowerPoint presentations. You also may want to videotape the student presentations!

TECH TREK Mobile Research
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DATE_____

AGENT NAME_____ CLASS_____

You have been invited on board TECH TREK to explore science and technology with Wright-Patterson Air Force Base microscopes and computers. Your assignment is to gather information for a report, which you will present at the conclusion of this mission. At the minimum, you should return with notes, several sketches and a photographic image from the SEM or Intel Play microscope. Be prepared to explain what you observed and learned. Agents should remember that for this assignment, both quality and quantity are important!

Be prepared to explain what you liked and didn't like about the equipment and the images you saw. When you sketch an image, include measurements and the magnification used. When you print a photo, include the magnification and the scale bar! Use all your senses to make observations.

Station Sketch and Description:

Station Sketch and Description:

Page Two

Attach a Photo with
Scale Bar to this page!

Station Sketch and Description:

Station Sketch and Description:

Your conclusions: